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Substitute
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Specification
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MOTION ACTUATOR

FIELD OF THE INVENTION

The present invention relates to a motion actuator, especially to a long distance linear motion actuator.

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BACKGROUND OF THE INVENTION

In nanotechnology, one of the key techniques is to achieve fine positioning with a sub-micrometer resolution. For example, in scanning probe microscopy, the probe has to be brought close to a sample from a few mm apart to within a distance of only a few nanometers. There are many other applications wherein fine positioning and 10 motion of articles are required.

An early type of a piezoelectric inchworm motor was disclosed by William G. May, Jr., in his US Patent No. 3,902,084, "Piezoelectric electromechanical translation apparatus" (assigned to Burleigh Instruments, Inc.). Later, H. Atsushi et al. disclosed a modification to May's invention in their U.S. Patent No. 4,570,096, 15 "Electromechanical translation device comprising an electrostrictive driver of a stacked ceramic capacitor type" (assigned to NEC Corporation.). They are used for micropositioning in scanning tunneling microscopes and atomic force microscopes.

Another type of an inchworm linear motor, based on the same operation mechanism as the Burleigh inchworm but with a very different mechanical design, 20 also applied to scanning tunneling microscopes, was disclosed by one of the inventors of this invention in his Ph.D thesis: I.S. Hwang, "Tunneling microscopy of dynamical processes on the PB/GE(111) surface, Harvard University, Division of Applied Sciences, 1993, Chapter 2.